

Patent Claims:

1. ~~Block copolymer containing~~
~~a hydrophobic biodegradable polymer,~~
~~a hydrophilic polymer,~~
~~at least one reactive group for covalent binding of a surface-modifying substance d)~~
~~to the hydrophilic polymer b);~~
~~wherein the at least one reactive group e) is selected from 1) a functional group and/or~~
~~2) an at least bifunctional molecule with at least one free functional group with the~~
~~provision that if the hydrophilic polymer b) is polyethylene glycol, the reactive group~~
~~e) is not hydroxyl.~~

2. ~~Block copolymer according to Claim 1,~~
~~characterised in that~~
~~the hydrophobic polymer a) and/or hydrophilic polymer b) are selected from a linear~~
~~and/or branched polymer.~~

3. ~~Block copolymer according to one of the preceding claims,~~
~~characterised in that~~
~~the hydrophobic polymer a) is at least one polymer selected from polyester, poly-ε-~~
~~caprolactam, poly-α-hydroxyester, poly-β-hydroxyester, polyamide, polyphosphazene,~~
~~polyanhydride, polydioxanon, polymalic acid, polytartaric acid, polyorthoester,~~
~~polycarbonate, peptide, polysaccharide and protein.~~

4. ~~Block copolymer according to Claim 3,~~
~~characterised in that~~
~~the hydrophobic polymer a) is at least one polymer selected from polylactide,~~
~~polyglycolide, poly(lactide-co-glycolide), poly-β-hydroxybutyrate and poly-β-~~
~~hydroxyvalerate.~~

1 ~~5. — Block copolymer according to one of the preceding claims;~~
2 ~~characterised in that~~
3 ~~the hydrophilic polymer b) is at least one polymer selected from polyethylene glycol;~~
4 ~~polypropylene glycol, polyethylene glycol/polypropylene glycol copolymer;~~
5 ~~polyethylene glycol/polypropylene glycol/polyethylene glycol copolymer;~~
6 ~~polybutylene glycol, polyacrylamide, polyvinyl alcohol, polysaccharide, peptide and~~
7 ~~protein.~~

8
9 ~~6. — Block copolymer according to one of the preceding claims;~~
10 ~~characterised in that~~
11 ~~the reactive group c) is at least one selected from an amino group, thiol, carboxylic~~
12 ~~acid, keto group, an acid chloride, dicarboxylic acid amide, 3-maleic imidopropionic~~
13 ~~acid-N-succinimidyl ester and succinimidyl ester.~~

14
15 ~~7. — Block copolymer according to one of the preceding claims;~~
16 ~~characterised in that~~
17 ~~the hydrophobic polymer a) is at least one selected from polylactide, polyglycolide~~
18 ~~and poly(lactide-co-glycolide).~~

19
20 ~~8. — Block copolymer according to Claim 7;~~
21 ~~characterised in that~~
22 ~~the hydrophilic polymer b) is polyethylene glycol.~~

23
24 ~~9. — Block copolymer according to Claim 8;~~
25 ~~characterised in that~~
26 ~~the polyethylene glycol has a molar mass in a range of 200 to 10 000 Da.~~

27

1 ~~10. — Block copolymer according to one of the preceding claims,~~
2 ~~characterised in that~~
3 ~~the hydrophobic polymer a) is polylactide preferably with a~~
4 ~~molar mass in a range of 1 000 to 100 000 Da.~~

5
6 ~~11. — Block copolymer according to one of the preceding claims,~~
7 ~~characterised in that~~
8 ~~the surface of the block copolymer is chemically structured by binding of surface-~~
9 ~~modifying substances d).~~

10
11 ~~12. — Block copolymer according to one of Claims 1 to 11, characterised in that~~
12 ~~the block copolymer additionally contains at least one surface-modifying substance~~
13 ~~d), wherein substance d) is bonded to the hydrophilic polymer b) by means of the~~
14 ~~reactive group e).~~

15
16 ~~13. — Block copolymer according to Claim 12,~~
17 ~~characterised in that~~
18 ~~the substance d) is at least one substance selected from a carbohydrate, peptide,~~
19 ~~protein, heteroglycan, proteo-glycan, glycoprotein, amino acid, fat, phospholipid,~~
20 ~~glycolipid, lipoprotein, medicinal agent, antibody, enzyme, DNA/RNA, a cell, dye~~
21 ~~and molecular sensor.~~

22
23 ~~14. — Shaped body formed from a block copolymer according to one of Claims 1 to~~
24 ~~13.~~

25
26 ~~15. — Shaped body according to Claim 14,~~
27 ~~characterised in that~~
28 ~~the shaped body is a film, particle, three-dimensional body, porous body or a sponge.~~

29

1 ~~16. — Use of a block copolymer according to one of Claims 1 to 15~~
2 ~~for the production of drug-targeting systems, drug-delivery~~
3 ~~systems, bioreactors, for therapeutic and diagnostic purposes, for tissue engineering~~
4 ~~and as emulsifier.~~

5
6 ~~17. — Process for the production of a block copolymer according to one of Claims~~
7 ~~12 or 13,~~
8 ~~characterised in that~~
9 ~~the at least one substance d) is converted with a block copolymer according to one of~~
10 ~~Claims 1 to 11, wherein the block copolymer is present in solution or in the solid~~
11 ~~phase.~~

12
13 ~~18. — Process according to Claim 17,~~
14 ~~characterised in that~~
15 ~~for binding the at least one substance d), the block copolymer according to one of~~
16 ~~Claims 1 to 11 is used in the form of a porous shaped body.~~

17
18 ~~19. — Process for the production of a block copolymer according to one of Claims~~
19 ~~12 or 13 or according to one of Claims 17 or 18,~~
20 ~~characterised in that~~
21 ~~in a first stage, the substance d) is provided with a reactive group e) and in a second~~
22 ~~stage, the complex composed of substance d) and reactive group e) is bonded by~~
23 ~~means of the reactive group e) to the hydrophilic polymer b) of a block copolymer~~
24 ~~composed of a hydrophobic polymer a) and a hydrophilic polymer b).~~

25
26 ~~20. — Process for the production of a block copolymer according to one of Claims~~
27 ~~12 or 13 or according to one of Claims 17 to 19,~~
28 ~~characterised in that —~~
29

1 ~~the binding of the at least one substance d) to the surface~~
 2 ~~of the block co-polymer is achieved by generating a substrate pattern.~~

3

4 21. — Process according to Claim 20;
 5 characterised in that
 6 the substance d) is applied with a locally constant or variable concentration by means
 7 of the reactive group e) on the surface of a block copolymer containing a hydrophobic
 8 component a) and hydrophilic component b);

9

10 22. — Process according to Claim 20 or 21;
 11 characterised in that
 12 for binding the reactive group e) and/or the substance d) in a substrate pattern, the
 13 surface of the block copolymer is structured by a plotter, an ink jet printer, radiation
 14 with light, bombardment with particles, stamping or soft lithography.

15

16 **Figures**

17 Abb. = Abbildung = Figure

18

19 **Figure 2**

20 bioabbaubares Polymer ——— = biodegradable polymer

21

22 nicht bioabbaubares bzw. ——— = non-biodegradable or slowly bio-

23 langsam bioabbaubares ——— degradable polymer

24 Polymer —————

25

26 Bindeglied ————— = binding link

27

28 Oberflächenmodifizierende

29 Substanz ————— = surface-modifying substance

1 **Figure 5**

2 Foetales Rinderserum ————— = foetal cow serum

3 Bindung ————— = bond

4

5 **Figure 6a**

6 Atriales Natriuretisches

7 Peptid ————— = atrial natriuretic peptide

8 Bindung ————— = bond

9

10 **Figure 6b**

11 Lachs - Calcitonin ————— = salmon - calcitonin

12

13 **Figure 7**

14 nach .. Stunden ————— = after .. hours

15

16 **Figure 9**

17 Farbstoffmenge ————— = amount of dye

18

19 **Figure 10**

20 aktives Polymer ————— = active polymer

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22 Glas ————— = glass

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